Module Title: Landfill Processes
Level: Five
Time Allowed Two hours

Instructions to students:
- Enter your student number not your name on all answer books.
- Answer all questions from Section A and two questions from Section B.
- Begin each question on a separate page; label each page clearly with the number of the question you are answering.
- Erasmus/ overseas students are permitted to take a bilingual dictionary into the exam room but will not be permitted any extra time.

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Section A

Answer all questions

1. Which leachate characteristics should be monitored and why? (8 marks)

2. Differentiate between the minimum standards for liners for the three types of landfill (as specified in Landfill Directive 1999/31/EC). (6 marks)

3. Identify three alternative materials that can be used for daily cover. For each answer give one advantage and one disadvantage. (6 marks)

4. What are the upper and lower explosive limits for methane? (3 marks)

5. State five things that should be monitored, on a landfill. (5 marks)

6. Outline three advantages of operating phasing on a landfill site. (6 marks)

7. Define “completion”, with respect to Landfill. (6 marks)

8. Which three factors must be taken into account when considering completion. (6 marks)

9. List four waste types banned from landfill by the Landfill Directive 1999/31/EC. (4 marks)

(Total Section A: 50 marks)
Section B

Answer two questions.

10. Microorganisms responsible for the degradation of waste in a landfill site gain all their nutrients from the waste. Describe how different waste types degrade in a landfill and critically assess how changing waste streams and types may influence microbial nutrition.

(25 marks)

11. 
   a. Describe the effects that untreated leachate would have if discharged to surface water.

(10 marks)

   b. Describe three methods of leachate treatment describing the scientific principles by which they work, commenting on their applicability.

(15 marks)

(Total: 25 marks)

12. The process of landfilling can have negative impacts on the environment. Critically assess the impacts and environmental protection measures used at modern UK landfill sites.

(25 marks)
13. 
   a. Label the gases A-E and the stages I-V in your answer book (not on the question paper).
      
      (10 marks)

   b. Describe the processes that accompany these phases in the production of landfill gas.
      
      (15 marks)
      
      (Total: 25 marks)